99 A Whale of a Tale

INVESTIGATION

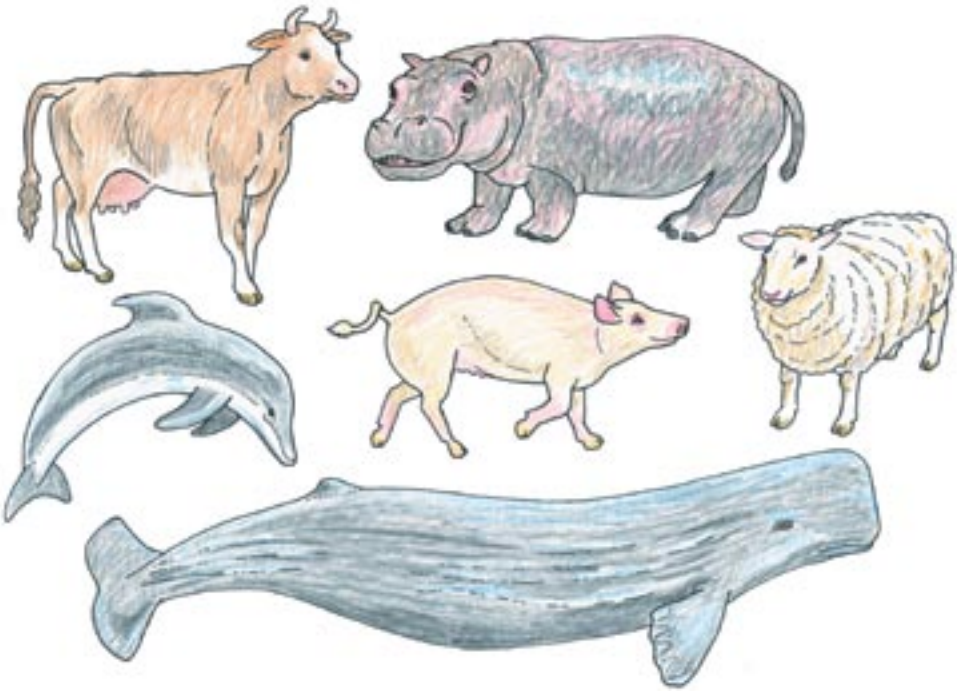
Whales, dolphins, and porpoises are mammals that live in the sea. Like all mammals, they are warm-blooded animals that give birth to live young and need air to breathe. DNA evidence shows that whales are closely related to hoofed land mammals such as hippopotamuses, pigs, cows, and sheep. All of these mammals are thought to have descended from a single species that lived millions of years ago and is now extinct. Besides DNA evidence, what other evidence suggests that these animals are related?

CHALLENGE **How are modern and fossil skeletons used to investigate evolution?**

MATERIALS

For each pair of students

- **1 set of 5 Skeleton Cards**
- **1 metric ruler (optional)**
- **1 Student Sheet 99.1, "Whale Fossil Chart"**



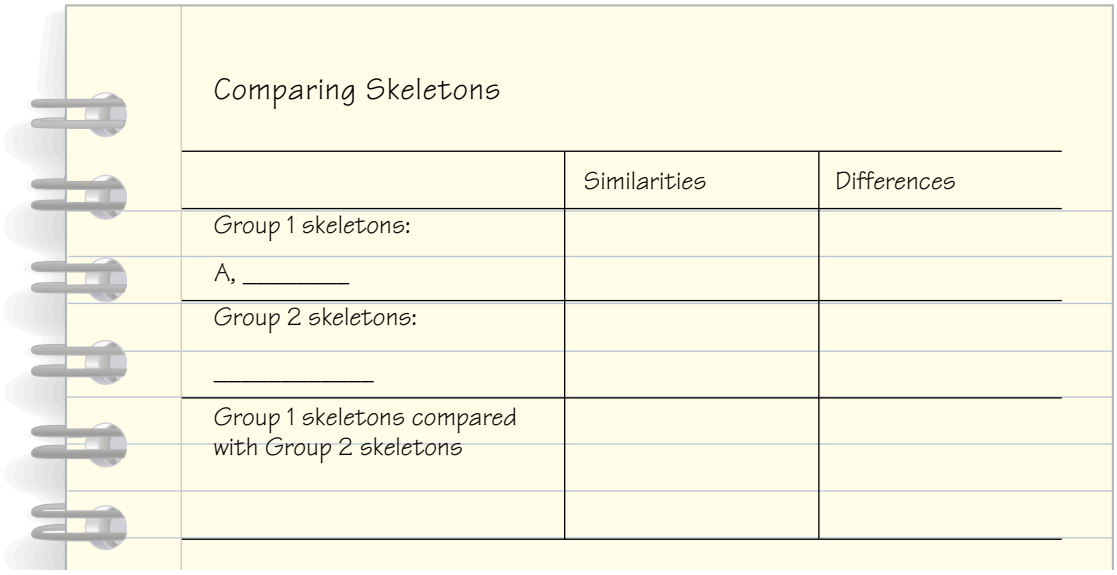
The Fossil Exhibit

You've just been hired as the assistant curator of the fossil collection of a museum. On your first day, you discover that the skeletons in the exhibit on the evolution of whales have all been moved to a new room and need to be arranged. Unfortunately, you are not a whale expert and the skeletons are not clearly labeled.

A local middle school has scheduled a field trip to the museum. It is very important that you arrange the skeletons properly before the students arrive. You decide to examine them to see if you can figure out how they should be arranged.

PROCEDURE

1. Compare the five Skeleton Cards. Based on similarities you observe, group the skeletons into two sets, each containing two or three cards. The set of skeletons containing Skeleton A should be called "Group 1." The other set of skeletons will be "Group 2."



Comparing Skeletons

	Similarities	Differences
Group 1 skeletons: A, _____		
Group 2 skeletons: _____		
Group 1 skeletons compared with Group 2 skeletons		

2. Create a table in your science notebook like the one shown above. In the first column, record which skeletons you put in each group.
3. Compare the skeletons *within* each group. In your table, describe and record as many similarities and differences as you can.

4. Compare Group 1 skeletons with those of Group 2. In your table, describe and record as many similarities and differences as you can.

5. *It's time to figure out how to arrange the exhibit!* Use similarities and differences in the skeletons to arrange the cards in order. (While all five skeletons can be in a single line, they don't have to be.) Record the order in which you have arranged the skeletons.

   Hint: Place the two least similar skeletons on either side of your desk. Then arrange the other three skeletons between them.

6. *You're in luck! You discover a chart with information about the relative ages of the five skeletons.* Collect Student Sheet 99.1, "Whale Fossil Chart," from your teacher.

7. Compare the age data from Student Sheet 99.1 with the order in which you placed the skeletons in Step 5. If necessary, rearrange your Skeleton Cards. Record your final reconstruction of the museum exhibit in your science notebook.

ANALYSIS

1. **a.** What kinds of skeletal changes appear to have occurred during the evolution of whales?

   b. What can you infer about the changes in habitat that occurred at the same time as these skeletal changes?

2. Use natural selection to explain how these changes (or one of these changes) could have occurred.

3. In this activity, you examined extinct and modern whale skeletons. How does the study of these skeletons provide evidence about how species are related?

4. Look again at Skeleton A. This is known as an ambulocetid (am-byoo-low-SEE-tid). The word *ambulocetid* means "walking whale." Where do you think the ambulocetids lived? Describe how you think they lived.

5. **Reflection:** Look at your answer to Reflection Question 6 from Activity 98, "Family Histories." Has your thinking changed?

EXTENSION

Find out more about current research on whale evolution. Start at the *Issues and Life Science* page of the SEPUP website.